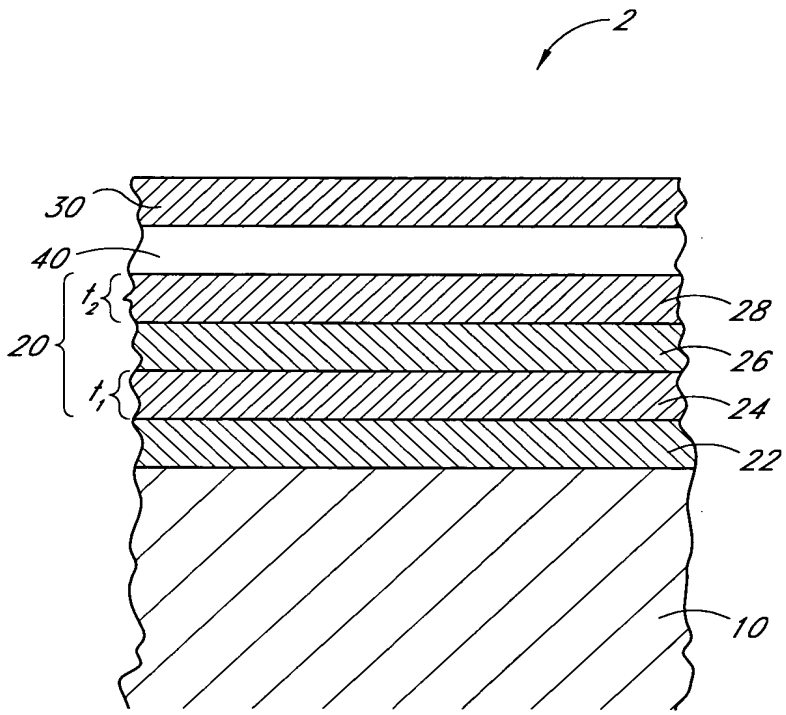

FIG. 1

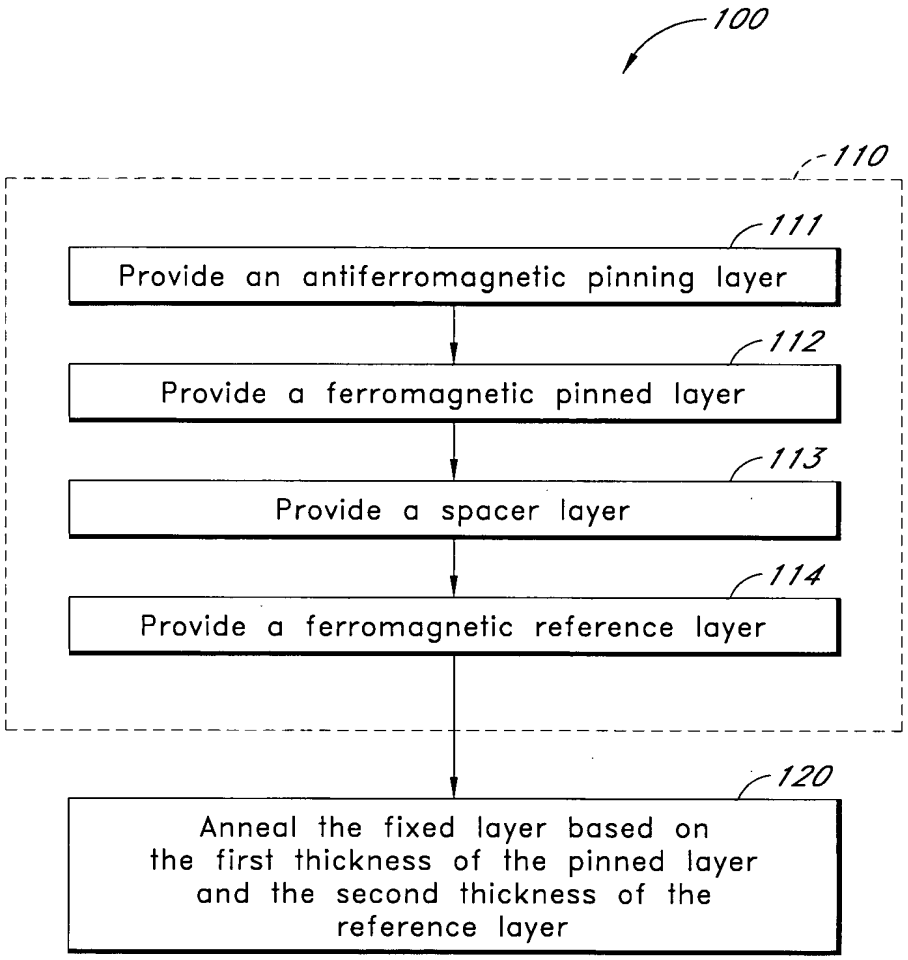
100
110
111
Provide an antiferromagnetic pinning layer
112
Provide a ferromagnetic pinned layer
113
Provide a spacer layer
114
Provide a ferromagnetic reference layer
120
Anneal the fixed layer based on the first thickness of the pinned layer and the second thickness of the reference layer

FIG. 2A

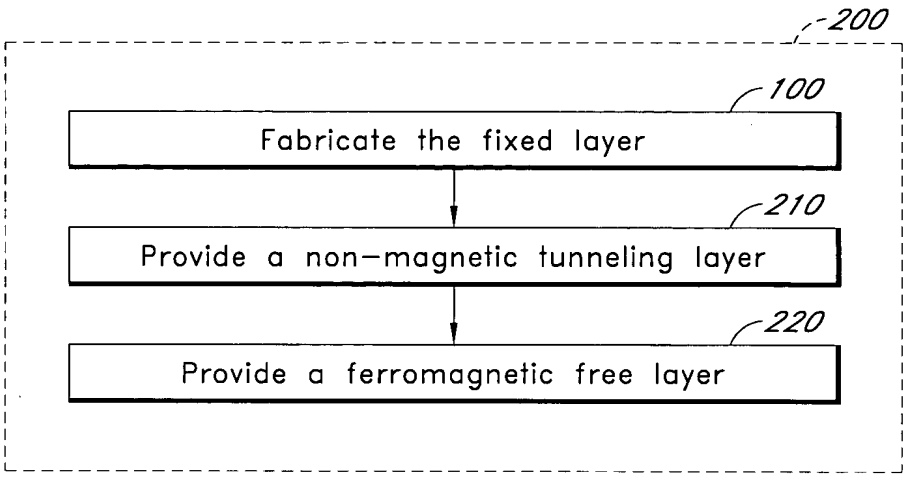
200
100
Fabricate the fixed layer
210
Provide a non-magnetic tunneling layer
220
Provide a ferromagnetic free layer

FIG. 2B

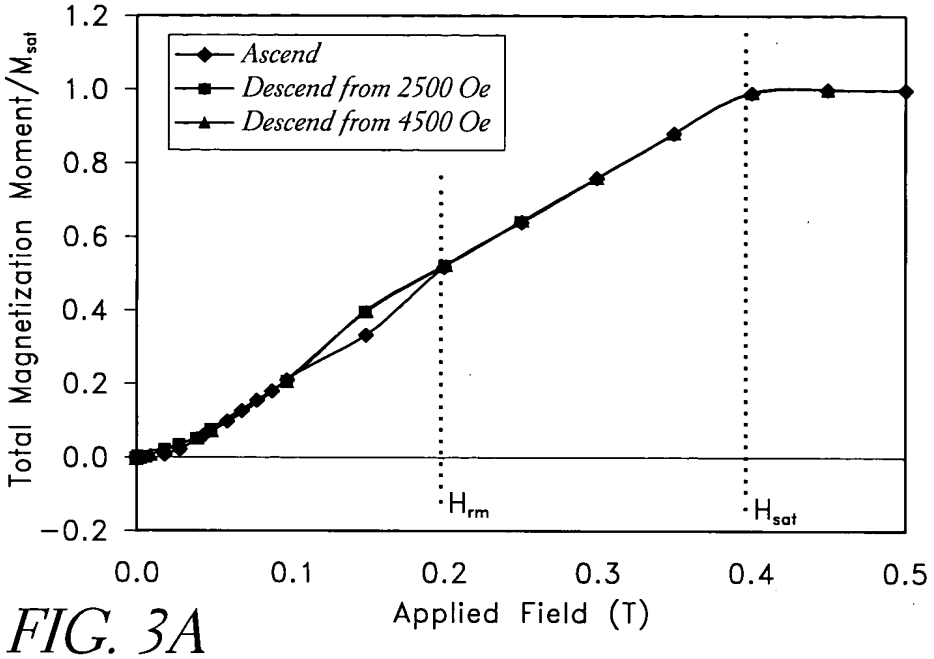
Total Magnetization Moment/M_{sat}
1.2
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
Ascend
Descend from 2500 Oe
Descend from 4500 Oe
H_{rm}
H_{sat}
0.0
0.1
0.2
0.3
0.4
0.5
Applied Field (T)

FIG. 3A

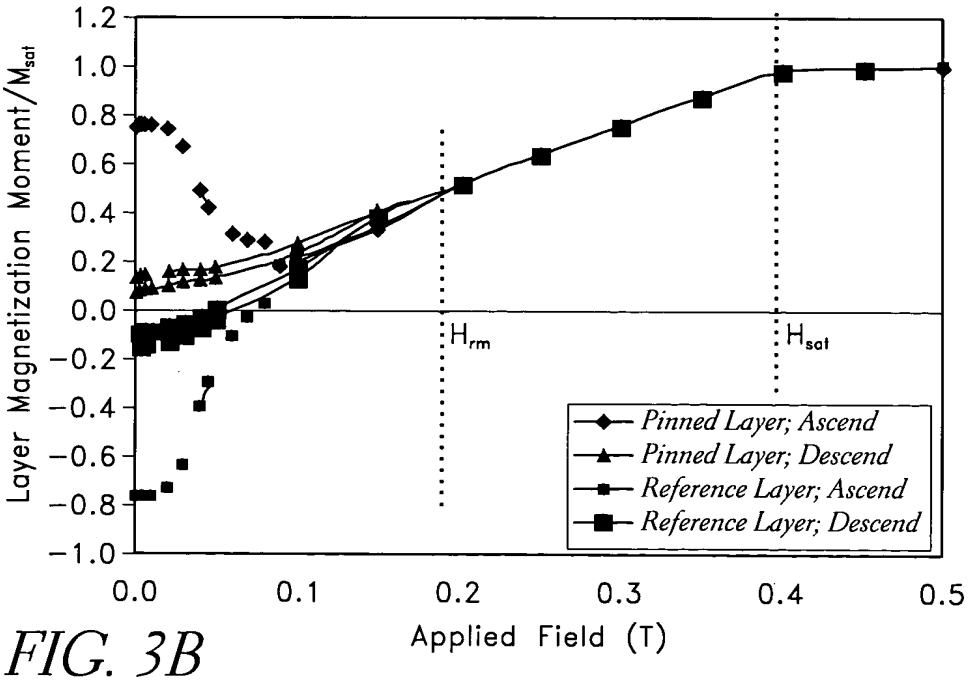
Layer Magnetization Moment/M_{sat}
1.2
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
−0.8
−1.0
H_{rm}
H_{sat}
Pinned Layer; Ascend
Pinned Layer; Descend
Reference Layer; Ascend
Reference Layer; Descend
0.0
0.1
0.2
0.3
0.4
0.5
Applied Field (T)

FIG. 3B

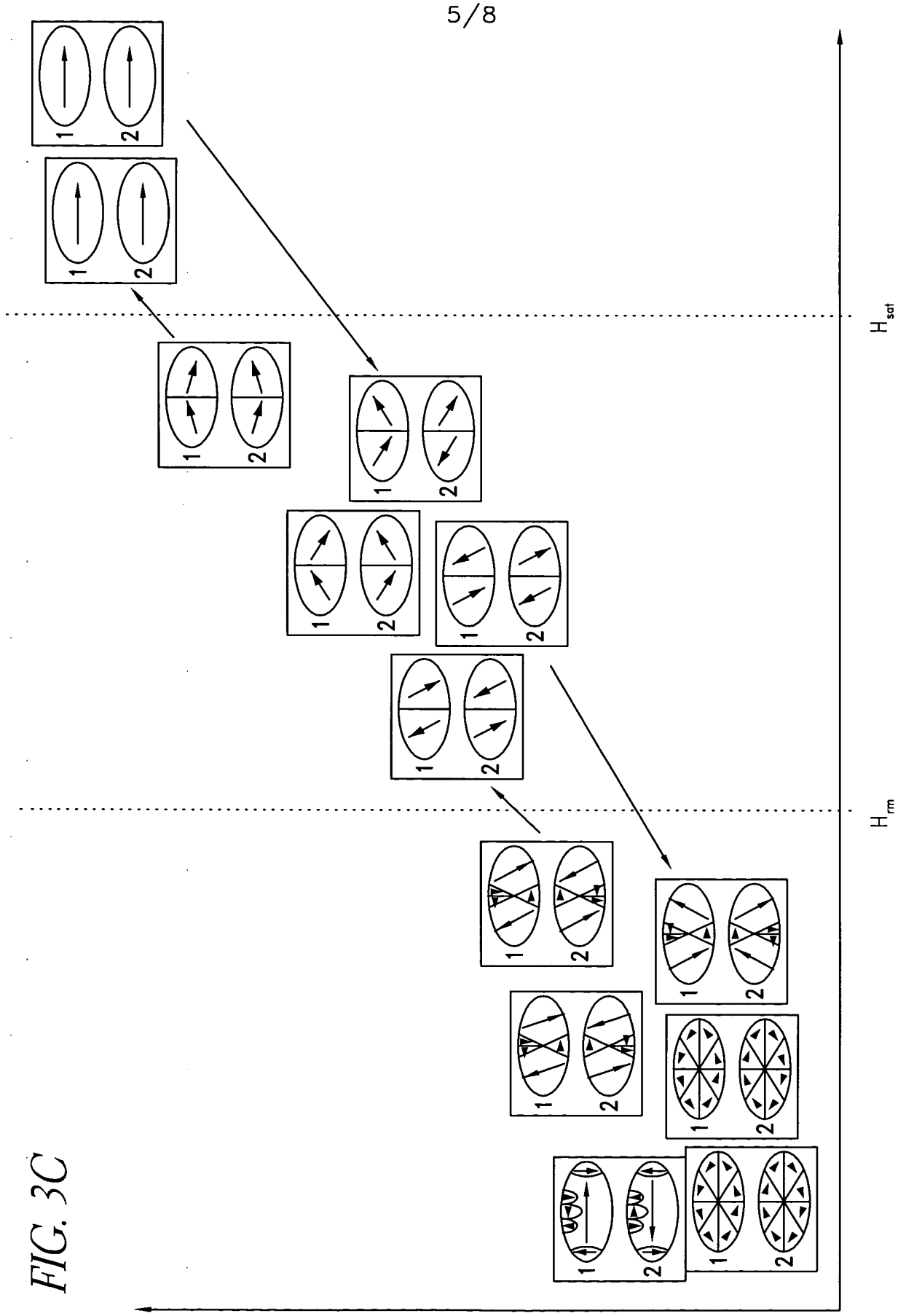

FIG. 3C

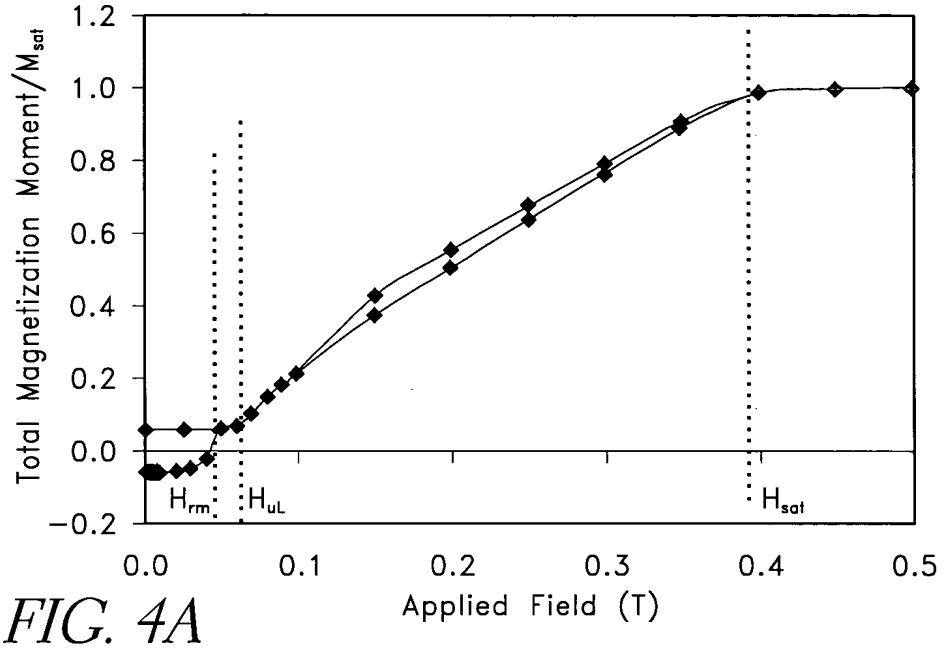
Total Magnetization Moment/M_{sat}
1.2
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
H_{rm}
H_{uL}
H_{sat}
0.0
0.1
0.2
0.3
0.4
0.5
Applied Field (T)

FIG. 4A

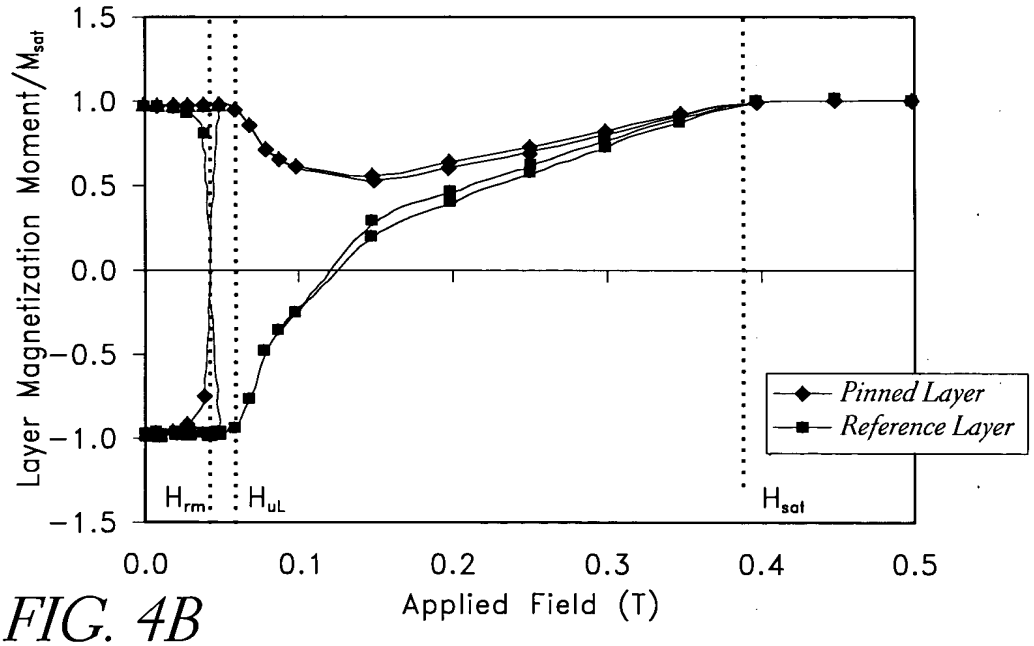
Layer Magnetization Moment/M_{sat}
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
H_{rm}
H_{uL}
H_{sat}
Pinned Layer
Reference Layer
0.0
0.1
0.2
0.3
0.4
0.5
Applied Field (T)

FIG. 4B

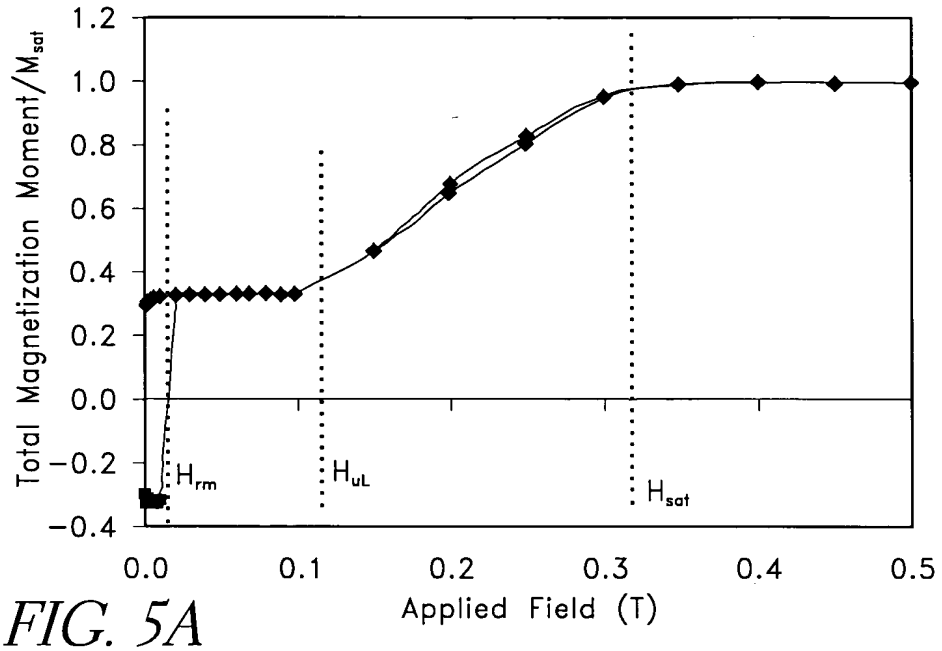
Total Magnetization Moment/M_{sat}
1.2
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
H_{rm}
H_{uL}
H_{sat}
0.0
0.1
0.2
0.3
0.4
0.5
Applied Field (T)

FIG. 5A

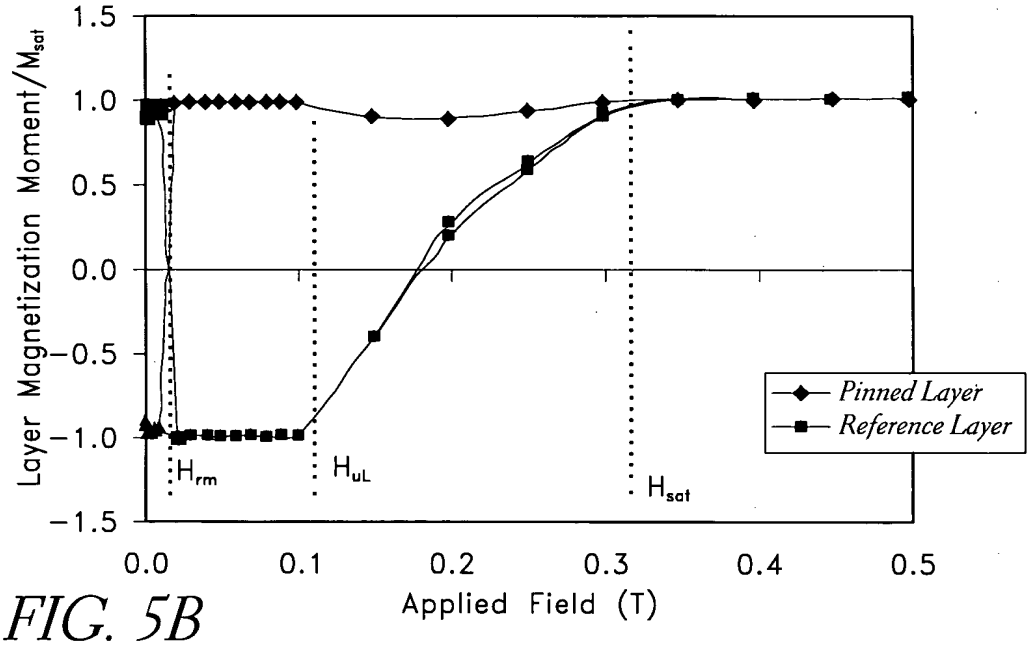
Layer Magnetization Moment/M_{sat}
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
H_{rm}
H_{uL}
H_{sat}
0.0
0.1
0.2
0.3
0.4
0.5
Applied Field (T)
Pinned Layer
Reference Layer

FIG. 5B

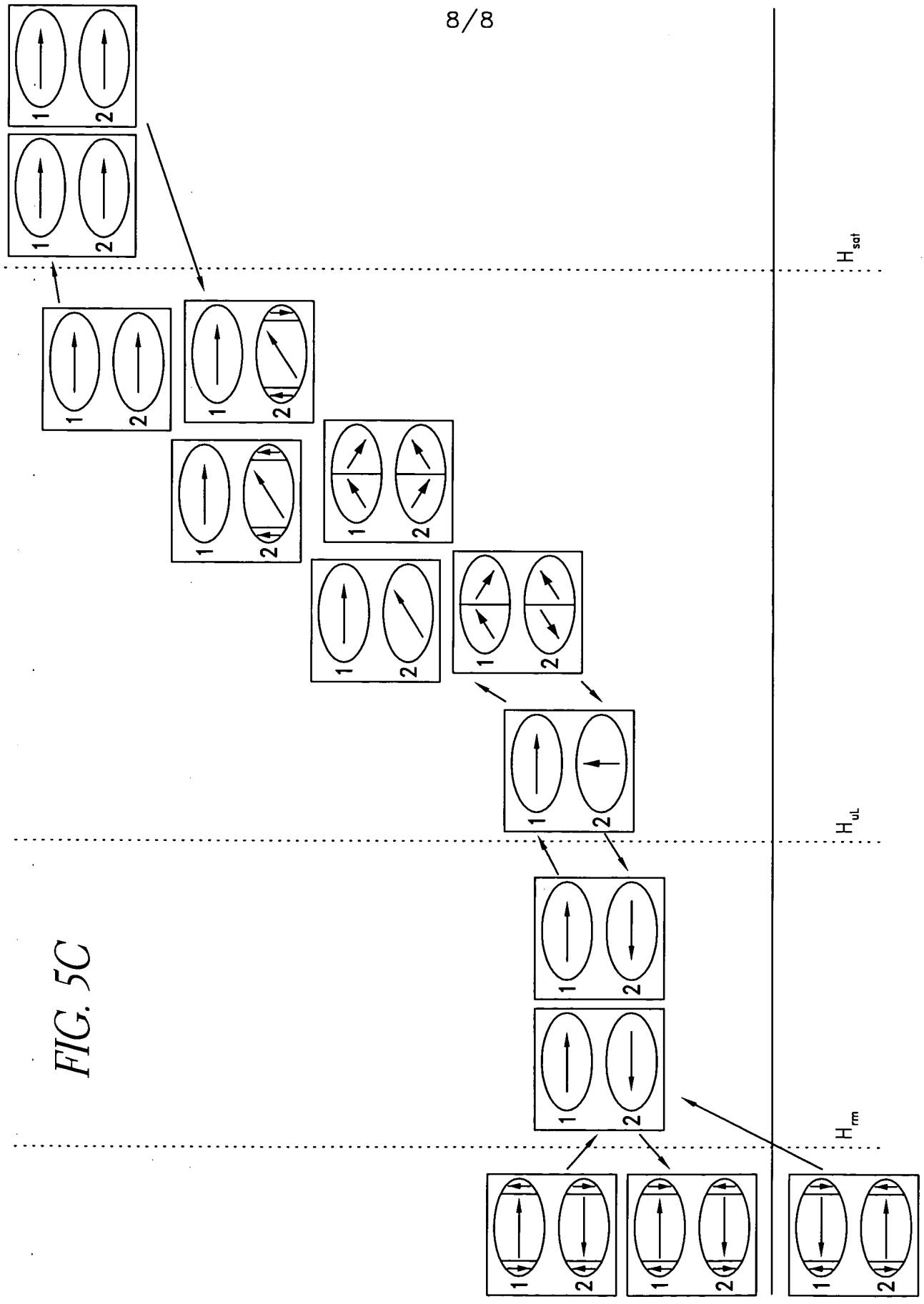

FIG. 5C